AMENDMENT TO THE CLAIMS

Please amend the presently pending claims as follows:

1.(Currently Amended) A method comprising steps of:

(a) determining an actuator state;

(b) responsive to the actuator state being a settle state, providing constants for a settle controller;

(c) responsive to the actuator state being a follow state, providing constants for a follow controller; and

(d) generating a control output using the constants provided in step (b) or (c) based on whether a position error signal running average exceeds a ~~running~~predetermined threshold.

2.(Original) The method of claim 1 wherein providing the constants for the follow controller includes selecting a first controller from a plurality of controllers, wherein the first controller is optimized for a first performance requirement.

3.(Original) The method of claim 2 wherein the first performance requirement is one of rotational/linear vibration and non-repeatable runout.

4.(Previously Presented) The method of claim 2 wherein selecting a first controller from a plurality of controllers includes:

responsive to the position error signal running average exceeding the predetermined threshold, selecting the first controller, wherein the first performance requirement is rotational vibration.

5.(Previously Presented) The method of claim 4 wherein selecting a first controller from a plurality of controllers includes:

applying a low pass filter to a position error signal before determining the position error signal running average.

6. (Previously Presented) The method of claim 1, further comprising:

determining a controller state for the settle, track follow controller.

7. (Original) The method of claim 6 wherein the controller state is determined using the following state equation:

$$x(k+1) = Ax(k) + Bu(k),$$

where $x(k+1)$ is an n-dimensional controller state vector for a time $k+1$, $u(k)$ is an input to the controller, and A and B are constant matrices of appropriate dimensions.

8. (Original) The method of claim 7 wherein the control output is generated using the following equation:

$$y(k) = Cx(k) + Du(k),$$

where $y(k)$ is an output for the settle, track follow controller and C and D are constant matrices of appropriate dimensions, including the constants provided in step (b) or (c).

9. (Original) The method of claim 1 wherein providing constants includes providing a reference to a storage location for the constants in a memory.

10. (Currently Amended) A method for optimizing a controller, comprising steps of:

(a) determining an actuator state;

(b) responsive to the actuator state being a settle state, providing constants to control the controller as a settle controller;

(c) responsive to the actuator state being a track follow state, providing constants to control the controller as a track follow controller; and

(d) generating a control output using the constants provided in step (b) or (c) based on whether a position error signal running average exceeds a ~~running~~predetermined threshold.

11. (Original) The method of claim 10 wherein providing constants for the track follow controller includes selecting a first controller from a plurality of controllers, wherein the first controller is optimized for a first performance requirement.

12. (Original) The method of claim 11 wherein the first performance requirement is one of rotational/linear vibration and non-repeatable runout.

13. (Previously Presented) The method of claim 11 wherein selecting a first controller from a plurality of controllers includes:

responsive to the position error signal running average exceeding the predetermined threshold, selecting the first controller, wherein the first performance requirement is rotational vibration.

14. (Previously Presented) The method of claim 13 wherein selecting a first controller from a plurality of controllers includes:

applying a low pass filter to a position error signal before determining the position error signal running average.

15.(Original) The method of claim 10, the method further comprising:

determining a controller state for the settle, track follow controller.

16.(Currently Amended) An apparatus comprising:

(a) at least one actuator;

(b) a memory; and

(c) a shared state controller, operatively coupled to the at least one actuator and the memory, to determine a controller state, select a first controller from a plurality of controllers based on whether a position error signal running average exceeds a ~~running~~predetermined threshold, receive constants for the first controller from the memory, generate a control output using the constants, and provide the control output to the at least one actuator.

17. (Previously Presented) The apparatus of claim 16 wherein the first controller is optimized for a first performance requirement.

18. (Previously Presented) The apparatus of claim 17 wherein the first performance requirement is one of settle, rotational/linear vibration, and non-repeatable runout.

19. (Previously Presented) The apparatus of claim 16 wherein the controller state is determined using the following state equation:

$$x(k+1) = Ax(k) + Bu(k),$$

where $x(k+1)$ is an n-dimensional controller state vector for a time $k+1$, $u(k)$ is an input to the controller, and A and B are constant matrices of appropriate dimensions.

20. (Previously Presented) The apparatus of claim 19 wherein the control output is generated using the following equation:

$$y(k) = Cx(k) + Du(k),$$

where $y(k)$ is an output for the settle, track follow controller and C and D are constant matrices of appropriate dimensions, including the constants provided in step (b) or (c).